



Certification

I, Alex Kent, a professional translator, hereby certify that the attached English document, Publication of an Unexamined Patent Application 06-343837, is a true and faithful translation from the Japanese language.

By Alex Kent Sept. 1, 2004

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(54) Title of Invention: HOLLOW FIBER MEMBRANE MODULE

(57) Abstract

Purpose

To provide a hollow fiber membrane module structure capable of uniformly and sufficiently washing the vicinity of a membrane water collection part by bubbling.

Constitution

In external pressure-type hollow fiber membrane modules which are provided with an adjacent air diffuser member 8 for washing, potting parts are disposed in two stages 2 and 3, and a water collection part 5 is set at the gap of the potting parts that are disposed in two stages, and also an air diffuser tube 9 is disposed so as to pass through the potting parts that are disposed in two stages, and one end of the air diffuser tube 9 is disposed so as to pass through is

opened to the air diffuser member 8, and the other end is opened to the potting part 2 upon which the hollow fiber membrane is stretched.

Claims

Claim 1

In external pressure-type hollow fiber membrane modules which are provided with an adjacent air diffuser member for washing.

this is a hollow fiber membrane module in which potting parts are disposed in two stages, and a water collection part is set at the gap of the potting parts that are disposed in two stages, and also an air diffuser tube is disposed so as to pass through the potting parts that are disposed in two stages, and one end of the air diffuser tube is disposed to be open to

the air diffuser member, and the other end is opened to the potting part upon which the hollow fiber membrane is stretched.

Detailed Description of the Invention

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Industrial Field of Use

This invention relates to hollow fiber membrane modules, and more specifically to hollow fiber membrane modules used to filter suspended material contained in raw water from rivers, lakes, septic tanks, city water, waste water, etc.

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Prior Art

Air is typically used for bubbling in technologies using hollow fiber membranes in order to wash the membrane module. Air bubbling as it is commonly used brings in air diffused from the outside of the membrane module. The air is diffused on the surface of the membrane module in external air diffusion, but insufficient air is diffused in the vicinity of the water collection part, which is the location at which the membrane is most apt to be clogged.

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Air diffusion bubbling apparatus has been disposed at the bottom of the membrane module when bubbling is used to peel sludge material in prior art single- or double-ended water collection-type modules. When the water collection part is at the bottom, air from the air diffusion pipes strikes the lower part of the water collection part, as shown in Figure 3, and is dispersed in its vicinity. Therefore, washing action by bubbling near the water collection part is insufficient. Moreover, as shown in Figure 4, even if the air diffusion part is inserted in the gaps, it is difficult to obtain uniform bubbling in the vicinity of the membrane water collection part. Thus, the prior

art washing methods have not been adequately able to perform bubbling washing in the vicinity of the water collection part where the process water flow rate is at its highest and clogging of the membrane is most advanced.

Problems the Invention is Intended to Resolve

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This invention solves the problems described above in the prior art, and its aim is to provide a hollow fiber membrane module with a structure that permits uniform and adequate washing by bubbling in the vicinity of the membrane water collection part.

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Means of Solving the Problems

In order to solve these problems, this is a hollow fiber membrane module in which potting parts are disposed in two stages, and a water collection part is set at the gap of the potting parts that are disposed in two stages, and also an air diffuser tube is disposed so as to pass through the potting parts that are disposed in two stages, and one end of the air diffuser tube is disposed to be open to the air diffuser member, and the other end is opened to the potting part upon which the hollow fiber membrane is stretched

0006

In the hollow fiber membrane module described above, it is acceptable for the shape of the potting part and the water collection part to be either circular, oblong, etc. Further, any material and diameter for the potting part may be used, and any of the typically-used materials for air diffusion tubes may be used without particular restriction.

0007

Operation of the Invention

The following description of this invention is made with reference to the drawings, but the invention is not limited to these.

Embodiment 1

Figure 1 shows a schematic cross section of the hollow fiber membrane of this invention. Figure 2 shows a partial enlargement of the potting part in Figure 1. In Figures 1 and 2, the hollow fibers 1 are supported by the lower potting part A2 and the upper potting part 4, a sealed water collection part 5 is disposed between the lower potting part A2 and the potting part B3 that supports the air diffusion tubes beneath the lower potting part A2, and the air diffusion tubes 9 pass through.

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Water that is treated by the hollow part is collected by the lower water collection 5, passes through the water collection part connecting pipe 7, flows into the upper water collection pipe 6, and is drained to the outside. The drainage of treated water may also be done directly from the lower water collection part 5. An air receiver part 10, which receives diffused air, is disposed in the lower portion of the potting part 3. If the bottom of the air receiver part 10 is open, it can be as wide as the opening diameter of the potting part. The air diffusion tubes 9, are tubes with a diameter of about 2-5 mm, and they pass through the potting [parts] A 2 and B 3, connecting the air receiver part 10 and the top surface of the potting part 2. The air diffusion tubes 9 should preferably be disposed uniformly relative to the potting part 2. Air that is expelled from the air diffusion pipe 11, first flows into the air receiver part 10, passes once again through the air diffusion tubes 9, and is diffused from the top surface of the potting part 2.

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Since air diffusion occurs in between the hollow fiber membranes, and from the potting part 2, the washing effect of the potting part and its vicinity is extremely high. Moreover, since the diffused air is efficiently used for washing because it passes through the gaps and rises, and even when the collection of water at both ends is at the top of the potting part the washing effect is enhanced since the air rises directly in the potting part. This embodiment shows an example where water collection is performed at both ends, but it can be implemented similarly in types where water is collected at one end and the water collection part is at the top of the air diffusion pipe, as well.

0011

Effect of the Invention

As a result of this invention, sludge clogging in the vicinity of the water collection part is eliminated, and increases in drive pressure due to clogging are minimized.

Brief Description of the Drawings

Figure 1 Schematic cross section of an embodiment of a hollow fiber membrane module of this invention

Figure 2 Partial enlargement of the lower potting part in Figure 1

Figure 3 Explanatory drawing of prior art air diffusion washing

Figure 4 Explanatory drawing of prior art air diffusion washing

Symbols

- 1 Hollow fibers
- 2 Lower potting part A
- 3 Lower potting part B
- 4 Upper potting part
- 5 Water collection part

- 6 Upper water collection part
- 7 Water collection part connecting pipe
- 8 Air diffusion part
- 9 Air diffusion tube
- 10 Air receiver part
- 11 Air diffusion pipe
- 12 Treated water

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